Taiwanese Journal of Obstetrics & Gynecology 56 (2017) 477–481

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Original Article

Evaluation of sclerotherapy for the treatment of infected postoperative lymphocele

Youdong Kim [a], Gyeong Sik Jeon [a, *], Sun Young Choi [b, **], Man Deuk Kim [c], Shin Jae Lee [a]

[a] Department of Radiology, CHA University School of Medicine, CHA Bundang Medical Center, 59 Yatap-ro, Bundang-gu, Seongnam, Republic of Korea
[b] Department of Radiology and Medical Research Institute, Ewha Womans University Mokdong Hospital, 1071 Anyangcheon-ro, Yangcheon-gu, Seoul, Republic of Korea
[c] Department of Radiology, Research Institute of Radiological Science, Yonsei University College of Medicine, 134 Sinchon-dong, Seodaemun-gu, Seoul, Republic of Korea

ARTICLE INFO

Article history:
Accepted 3 October 2016

Keywords:
Infection
Lymphocele
Sclerotherapy
Catheterization

ABSTRACT

Objective: To evaluate the efficacy and safety of sclerotherapy as the treatment of infected postoperative lymphocele in gynecologic malignancy patients.
Materials and methods: Percutaneous catheter drainage (PCD) with or without sclerotherapy was performed for postoperative lymphocele in 75 patients from 2002 to 2014. Eighty-eight lymphoceles (43 non-infected as group A, 45 infected as group B) in 75 patients (mean age ± SD; 50.3 ± 11.3) were included. Sclerotherapy was performed in 17 (39.5%, group A-S) lymphoceles in group A and 14 (31.1%, group B-S) in group B. Absolute ethanol was the most frequently used sclerosant (28 of total 36 sessions). Mean follow-up period was 37 months (range: 1–154).
Results: Sclerotherapy was clinically successful in 13 lymphoceles in both group A-S (76.5%) and group B-S (92.9%) without statistical significance. Compared to the pre-sclerotherapy period, group B-S demonstrated significantly decreased drainage volume after sclerotherapy (662.7 ml vs. 100.6 ml, $p = 0.019$). Group A-S failed to demonstrate significant decrease in drainage volume after sclerotherapy. Recurrence occurred in 4 patients in group A-S and 1 in group B-S, without statistical significance. No major complication was noted.
Conclusion: Sclerotherapy significantly reduces the drainage volume, and might help shorten catheter placement time in infected lymphoceles.

Introduction

Lymphocele is an abnormal collection of lymphatic fluid that usually develops after surgery involving lymphadenectomy of the pelvis. It is different from a true cyst in that its fibrotic wall lacks an epithelial lining [1]. The incidence of postoperative lymphocele reportedly ranges from 8 to 48% after pelvic lymphadenectomy [2]. Since most lymphoceles are asymptomatic and resolve spontaneously, they are not indications for treatment [1–3]. A minority of lymphoceles, ranging from 4 to 7%, persist and cause symptoms due to compression of adjacent structures and in some cases become infected leading to fever, tenderness, leg swelling or even sepsis and death [1,2].

Initially, the treatment for symptomatic lymphoceles was surgical marsupialization, first by open surgery and later by laparoscopic surgery. Successful percutaneous catheter drainage (PCD) was first reported by Aronowitz and Kaplan in 1983 [4] and has since become the first line treatment method in many institutions [1]. The addition of sclerotherapy with variable agents is reportedly effective in certain non-infected lymphoceles, as compared to PCD alone [1,2,5–8]. However, the treatment of infected lymphoceles is a less-discussed topic in the literature, especially with regards to the use of sclerotherapy in addition to PCD.

The objective of this study was to assess the efficacy and safety of sclerotherapy after PCD as treatment of infected lymphoceles in patients who received pelvic or abdominal surgery for gynecologic malignancies, as compared to treatment with PCD without sclerotherapy.

* Corresponding author. Fax: +82 31 780 5381.
** Corresponding author. Fax: +82 2 2655 0984.
E-mail addresses: hae0820@naver.com (G.S. Jeon), medmath@hanmail.net (S.Y. Choi).

http://dx.doi.org/10.1016/j.tjog.2016.10.002

Materials and methods

Approval of the Institutional Review Board was obtained. The database of patients who received PCD with or without sclerotherapy for the treatment of lymphoceles that developed after surgery for gynecologic malignancy from March 2002 to December 2014 at 2 tertiary referral hospitals was retrospectively reviewed. The diagnosis of a lymphocele was based on postoperative imaging findings of a walled-off lobulated fluid collection with or without septa at the site of surgery. A lymphocele was considered infected in the following cases: grossly purulent initially drained fluid from PCD, positive fluid culture, suspicious infection sign on computed tomography such as irregular thickness and enhancing wall with surrounding infiltration, and fever and laboratory results implying inflammation (leukocytosis and elevated c-reactive protein) without any other identifiable cause. Patients were divided into 4 groups according to the infection status of the lymphocele and whether sclerotherapy was performed. Demographics, procedural details, complications and recurrence rates were analyzed for each group. The analyzed procedural details included catheter placement time, drainage volume and period from operation to lymphocele detection. For patients who received sclerotherapy, the drainage volume was analyzed for the pre- and post-sclerotherapy period.

Technical success for PCD was defined as the successful insertion of PCD without immediate complications such as excessive bleeding and technical success for sclerotherapy was defined as completion of sclerotherapy without visible leakage. Clinical success for both PCD and sclerotherapy was defined as resolution of a lymphocele during the entire follow-up period. Resolution was defined as total non-visualization of the lymphocele after treatment on computed tomography or decrease to a minimal size with no symptoms. Recurrence was defined as increased size of a lymphocele with relevant symptoms after a period of resolution and removal of the PCD catheter.

Patients

Eighty-eight lymphoceles in 75 patients (mean age ± SD; 50.3 ± 11.3) were included (Table 1). Forty-three lymphoceles in 36 patients were non-infected (group A, mean age ± SD; 50.6 ± 12.7) and 45 lymphoceles in 41 patients were infected (group B, mean age ± SD; 49.9 ± 10.0). Two patients had both a non-infected and infected lymphocele. Ovarian cancer and cervical cancer were the most common underlying malignancy in each group (group A 38.9% vs. group B 43.9%), respectively.

PCD and sclerotherapy

Both procedures were performed in the interventional radiology room under sonographic and/or fluoroscopic guidance.

In group A, sclerotherapy was performed in 17 lymphoceles (39.5%, group A-S) and PCD alone was performed in 26 (60.5%, group A-P). In group B, sclerotherapy was performed in 14 lymphoceles (31.1%, group B-S) and PCD alone was performed in 31 (68.9%, group B-P) (Table 1).

Sclerotherapy was indicated in addition to PCD in various situations including, no change or increased amount of daily drainage volume from PCD catheter, no change of or increased size of lymphocele in follow-up imaging, prolonged catheter maintenance, and, and severe symptoms of patient. Sclerotherapy was performed on the same day as PCD insertion on 7 lymphoceles in 5 patients (group A-S; 5 lymphoceles in 3 patients, group B-S; 2 lymphoceles in 2 patients) as a policy of a specific interventional radiologist. Other sclerotherapy sessions were performed at varying intervals from PCD insertion. For infected lymphoceles, sclerotherapy was performed after confirmation of decreased purulence of drained lymphocele fluid or improvement of clinical symptoms or lab findings. The lymphoceles of the 2 patients in group B-S who received PCD and sclerotherapy on the same day where not suspected of infection at the time of procedure, and confirmation of infected lymphocele was made via lymphocele fluid analysis.

In total, 36 sessions of sclerotherapy were performed in 31 lymphoceles. Three sessions were performed on a single lymphocele in 1 patient in group A-S. Two sessions were performed on a single lymphocele in 3 patients in group A-S, respectively. For all 14 lymphoceles in group B-S and the remaining 13 lymphoceles in group A-S, 1 session of sclerotherapy was performed. In the 36 sclerotherapy sessions, absolute ethanol was the most frequently used sclerosant (28 sessions), followed by 30% povidone-iodine (4 sessions), 50% acetic acid (3 sessions), and 3% sodium tetradecyl sulfate (1 session). Sclerosants were chosen based on the patient's known past history of hypersensitivity to a sclerosant and familiarity of the interventionist with a specific sclerosant. Of the 28

Table 1
Characteristics of patients.

	Non-infected (Group A)		Infected (Group B)		p Value
	Sclerotherapy (Group A-S)	PCD[a] (Group A-P)	Sclerotherapy (Group B-S)	PCD (Group B-P)	
Number of patients	36[b,c]		41[c]		
	13[a]	24[a]	12	29	
Mean age ± SD[d]	50.69 ± 12.73		49.95 ± 10.05		>0.05
Gynecologic malignancy					>0.05
Ovary cancer	14		17		
	5	9	3	4	
Endometrial cancer	13		6		
	5	8	2	4	
Cervical cancer	9		18		
	3	6	7	11	
Number of lymphoceles	43		45		
	17 (39.55)	26 (60.5%)	14 (31.1%)	31 (68.9%)	>0.05[e]
Interval from operation to detection of lymphoceles (days)	67.3 ± 60.94		73.67 ± 78.5		>0.05

[a] Percutaneous drainage.
[b] One patient had 2 noninfected lymphoceles; 1 was treated with PCD alone, one was treated with PCD and sclerotherapy.
[c] Two patients had both infected and noninfected lymphoceles.
[d] Standard deviation.
[e] Compared between group A-S and group A-P, and between group B-S and group B-P.

sessions that used absolute ethanol as a sclerosant, data on the injected volume was available for 24 sessions and the mean injected volume was 13.6 ml (range: 1–80). Sclerotherapy was performed by the following steps. First, contrast material was injected into the lymphocele through the PCD to rule out the presence of leakage. Subsequently, to prevent dilution of the sclerosant to be injected, the internal contents of the lymphocele were aspirated as much as possible through the PCD. Then the sclerosant was injected and allowed to remain for a total of 5–20 min. The position of the patient was changed to ensure that the entire internal surface of the lymphocele wall was in even contact with the sclerosant; typically from supine to left (or right) decubitus, to prone, to right (or left) decubitus. The injected sclerosant was aspirated as much as possible before termination of the session.

All patients received proper antibiotic coverage at the time of PCD catheter insertion and sclerotherapy.

Follow-up imaging

Sixty-five patients were followed up by computed tomography and/or magnetic resonance imaging to confirm the size and rule out the recurrence of lymphoceles. The average follow-up period after initial PCD insertion was 37 months (range; 1–154).

Statistical analysis

Wilcoxon signed rank test, Mann–Whitney test and Pearson's chi-squared test were used for non-parametric analyses. Student's *t*-test was used for parametric analyses. All analyses were performed with SPSS, version 22.0 (IBM) and a p value < 0.05 was considered as statistically significant.

Results

Technical success was achieved in all lymphoceles in both groups (100%). Clinical success rate was 79.1% (34/43) for group A and 91.2% (41/45) for group B. The clinical success rate was 76.5% (13/17) for group A-S and 92.9% (13/14) for group B-S. All patients who showed decreased size of lymphoceles on follow-up imaging reported absence of lymphocele-related symptoms and vice versa. There was no statistical significance between clinical success rates of each pair of groups (Table 2).

The total drainage volume of the infected group (group B) was significantly smaller than that of the non-infected group (group A). Catheter placement time, drainage volume, and interval from operation to lymphocele detection showed no statistical significance (Table 2).

When divided into pre- and post-sclerotherapy period, group B-S demonstrated significantly decreased drainage volume after sclerotherapy (662.7 ml vs. 100.6 ml, $p = 0.019$). Group A-S failed to demonstrate statistically significant decrease in drainage volume after sclerotherapy (Table 3). The catheter placement time was not significantly different in both the pre- or post-sclerotherapy period when compared between group A-S and B-S (Table 4).

Table 3
Drainage volume before and after sclerotherapy.

	Drainage volume (cc)		p Value
	Before sclerotherapy	After sclerotherapy	
Total	1366.91 ± 2888.69	993.65 ± 2722.23	0.018
Group A-S (non-infected)	2178.73 ± 3904.28	1967 ± 3777.38	>0.05
Group B-S (infected)	622.75 ± 1252.29	100.67 ± 175.27	0.019

Table 4
Catheter placement time before and after sclerotherapy.

	Catheter placement time (days)	
	Before sclerotherapy	After sclerotherapy
Group A-S (non-infected)	6.07 ± 6.94	9.50 ± 13.71
Group B-S (infected)	8.79 ± 7.75	8.77 ± 14.28
p Value	>0.05	>0.05

Recurrence occurred in 9 patients in group A (group A-S; 4, group A-P: 5, $p > 0.05$) and 4 in group B (group B-S; 1, group B-P; 3, $p > 0.05$) (Table 2). Of the 9 recurred lymphoceles in group A, 4 (group A-S; 2, group A-P: 2) were treated with PCD, 4 (group A-S; 2, group A-P: 2) were treated with sclerotherapy, and 1 in group A-P was treated with conservative methods. Of the 4 recurred lymphoceles in group B, 2 in group B-P were treated with PCD, 1 in group B-P was treated with sclerotherapy, and 1 in group B-S was treated with aspiration. Resolution was achieved after the post-recurrence treatments in all recurred lymphoceles. There was no major complication in this study. There were 4 cases of minor complications in group A and 3 cases in group B, all of which were not directly attributable to sclerotherapy. In group A-S, there was 1 case of lymphocele infection after sclerotherapy, and in group A-P one PCD catheter was unintentionally dislodged and 2 cases were complicated by lymphocele infection after PCD catheter insertion. In group B-S, one PCD catheter was exchanged due to partial obstruction by debris and in group B-P one PCD catheter was exchanged due to insertion site oozing and another catheter was unintentionally dislodged.

Discussion

Treatment differs for non-infected and infected lymphoceles. Several studies have reported that sclerotherapy is a safe and effective treatment in addition to simple PCD for non-infected lymphoceles [1,2,5–8]. The mechanism of sclerotherapy is via obliteration of the lymphatic leak by causing local inflammation and subsequent fibrosis of the lymphocele [1,2].

However, a small number of studies have focused on the treatment of infected lymphoceles in specific; furthermore, to the best

Table 2
Results of lymphocele treatment.

	Non-infected (Group A)		Infected (Group B)		p Value
	Sclerotherapy (Group A-S)	PCD (Group A-P)	Sclerotherapy (Group B-S)	PCD (Group B-P)	
Drainage volume (ml)	2826.28 ± 5036.75		1142.42 ± 2623.82		0.017
	3307.29 ± 6926.78	2457.17 ± 3038.45	723.42 ± 1306.64	1335.81 ± 3051.98	>0.05[a]
Total catheter placement time (days)	19.26 ± 17.17		15.64 ± 18.72		>0.05
	16.41 ± 18.35	21.94 ± 16.07	17.62 ± 20.74	14.65 ± 17.98	>0.05[a]
Number of recurrences	9 (20.9%)		4 (8.8%)		>0.05
	4 (23.5%)	5 (19.2%)	1 (7.1%)	3 (9.75)	>0.05[a]

[a] Compared between group A-S and group A-P, and between group B-S and group B-P.

of our knowledge, only 2 studies to date have focused on sclerotherapy in addition to PCD for the treatment of infected lymphoceles [7,9]. Infected lymphoceles are not candidates for surgical marsupialization because the infection can spread into the peritoneal cavity [1]. Hence, they have usually been treated solely with PCD [1,5,10].

Inducing an inflammatory reaction at the lymphocele by sclerotherapy in a patient with a preestablished inflammation (infected lymphocele) may lead to complications. Oh et al. reported 1 case of fistula formation of a possibly infected lymphocele (tenderness and mild fever) with the urinary bladder after receiving sclerotherapy [11]. Apparently, PCD and multiple sclerotherapy sessions were performed when the patient was still febrile. This vesicolymphocele fistula healed spontaneously with conservative management. Except for this single report, there is no definite evidence in the literature against the application of sclerotherapy to infected lymphoceles. On the other hand, Kurata et al. treated 9 infected lymphoceles with sclerotherapy without any complications [9]; and Alago et al. treated 4 infected lymphoceles with sclerotherapy without any major complications.

In the study by Kurata et al., patients with non-infected lymphoceles were not included [9]. In the study by Alago et al., non-infected lymphoceles were included, but statistical analysis was not performed between the 2 groups [7]. These are the only 2 reports of sclerotherapy in the treatment of infected lymphoceles, to our knowledge. In our study, both infected (group A) and non-infected (group B) lymphoceles were included and subgroups were divided by treatment (sclerotherapy; group A-S and B-S, PCD; group A-P and B-P). Statistical analysis was performed for comparison between each group.

In our study, the total drainage volume of infected lymphoceles (group B) was significantly smaller, as compared to the non-infected lymphoceles (group A). This finding suggested that infection of the lymphocele possibly obliterates the lymphatic leakage through a mechanism similar to that of sclerotherapy i.e., inflammation and subsequent fibrosis of the lymphocele. We further observed that the drainage volume decreased significantly after sclerotherapy in infected lymphoceles (group B-S) but not in non-infected lymphoceles (group A-S). It can be inferred that the underlying inflammation of the lymphocele caused by infection played a major role in the significant decrease in drainage volume after sclerotherapy in group B-S.

Based on these 2 previous findings, we expected that the catheter placement time after sclerotherapy would be shorter for group B-S, as compared to A-S. Although the mean time was shorter for group B-S, it was statistically insignificant. This finding may be attributable to the different criteria of the gynecologists who decided when to remove the drainage catheter. Some catheters were removed once the daily drainage volume dropped below a certain level and some catheters were kept despite minimal daily drainage volume and removed on the day of discharge.

The recurrence rate was not significantly different between groups B-S and B-P. And no major complications were noted in any of the 75 patients during follow-up. The absence of major complications in group B-S is partially attributable to our policy of performing sclerotherapy after confirming signs of clinical improvement that probably prevented excessive inflammation by sclerosant injection. Thus, our study suggested that the use of sclerotherapy in infected lymphoceles is a safe treatment to decrease the drainage volume that might lead to reduced catheter placement time.

A finding of note is that patients only treated with PCD (group A-P and group B-P) showed comparable results with those treated with additional sclerotherapy (group A-S and group B-S) in both groups of infected and noninfected lymphoceles. Since sclerotherapy was performed in lymphoceles in situations such as no decrease in drainage volume from PCD catheter, increased lymphocele size in follow-up imaging, or severe symptoms, it suggested that PCD alone is an effective treatment in lymphoceles with gradually decreasing size and drainage volume over time.

Indications for sclerotherapy in lymphoceles vary among different studies. Caliendo et al. [12] initiated sclerotherapy when the patient became asymptomatic, drainage had slowed to less than 30 mL/d and follow-up imaging showed either near complete or total resolution of the lymphocele. In contrast, Alago et al. [7] initiated sclerotherapy when the catheter drainage persistently exceeded 50 ml/d and it was performed on near complete collapse of the lymphocele cavity. The non-decreasing drainage volume as an indication of sclerotherapy in our study is similar to that of the latter study. Injecting the sclerosant after maximal aspiration through the PCD catheter in our study is another similarity with the latter study. Since the lymphoceles with gradually decreasing draining volume in our study showed good results only with PCD treatments, we suggest that sclerotherapy may be unnecessary for lymphoceles with decreasing drainage and should be reserved for those with persistent drainage volume.

There were several limitations to this study. It was a retrospective study prone to inherent biases. Another limitation was the different procedure protocols between the individual interventional radiologists. In particular, lack of definite criteria on initiating sclerotherapy and removing the drainage catheter might have prevented some patients in the PCD group to benefit from sclerotherapy. It also does not allow accurate analysis of sclerotherapy and catheter placement time. Further prospective trials with strict criteria are necessary.

In conclusion, sclerotherapy significantly reduces the drainage volume, and therefore might help to shorten catheter placement time in infected lymphoceles.

Conflicts of interest statement

The authors have no conflicts of interest relevant to this article.

References

[1] Karcaaltincaba M, Akhan O. Radiologic imaging and percutaneous treatment of pelvic lymphocele. Eur J Radiol 2005;55:340–54.
[2] Mahrer A, Ramchandani P, Trerotola SO, Shlansky-Goldberg RD, Itkin M. Sclerotherapy in the management of postoperative lymphocele. J Vasc Interv Radiol 2010;21:1050–3.
[3] Hiramatsu K, Kobayashi E, Ueda Y, Egawa-Takata T, Matsuzaki S, Kimura T, et al. Optimal timing for drainage of infected lymphocysts after lymphadenectomy for gynecologic cancer. Int J Gynecol Cancer 2015;25:337–41.
[4] Aronowitz J, Kaplan AL. The management of pelvic lymphocele by the use of percutaneous indwelling catheter inserted with ultrasound guidance. Gynecol Oncol 1983;16:292–5.
[5] Kim JK, Jeong YY, Kim YH, Kim YC, Kang HK, Choi HS. Postoperative pelvic lymphocele: treatment with simple percutaneous catheter drainage. Radiology 1999;212:390–4.
[6] Zuckerman DA, Yeager TD. Percutaneous ethanol sclerotherapy of postoperative lymphoceles. Am J Roentgenol 1997;169:433–7.
[7] Alago Jr W, Doedhar A, Michell H, Sofocleus CT, Covey AM, Solomon SB, et al. Management of postoperative lymphoceles after lymphadenectomy: percutaneous catheter drainage with and without povidone-iodine sclerotherapy. Cardiovasc Interv Radiol 2013;36:466–71.
[8] Rivera M, Marcen R, Burgos J, Arranz M, Rodriguez R, Teruel JL, et al. Treatment of posttransplant lymphocele with povidone-iodine sclerosis: long term follow-up. Nephron 1996;74:324–7.

[9] Kurata H, Aoki Y, Tanaka K. Simple one-step catheter placement for the treatment of infected lymphocele. Eur J Obstet Gynecol Reprod Biol 2003;106:69–71.
[10] Treiyer A, Haben B, Stark E, Breitling P, Steffens J. Uni- vs. multiloculated pelvic lymphoceles: differences in the treatment of symptomatic pelvic lymphoceles after open radical retropubic prostatectomy. Int Braz J Urol 2009;35:164–9.
[11] Oh SJ, Kim SH, Kim HH. Vesicolymphocele fistula following sclerotherapy for lymphocele. J Urol 2004;172:2266.
[12] Caliendo MV, Lee DE, Queiroz R, Waldman DL. Sclerotherapy with use of doxycycline after percutaneous drainage of postoperative lymphoceles. J Vasc Interv Radiol 2001;12:73–7.